SAND2014-20293C

Title: Professional and novice differences in domain general and domain specific tasks: When expertise impacts cognitive and visual processes

Authors: Stephanie McMichael and Laura Matzen

Abstract:

In numerous domains, ranging from radiology to intelligence analysis, professionals rely on visual search to find and identify decision-relevant information. Despite its importance, there has been relatively little research on the effects of professional experience on visual search and visual cognition. While some studies have indicated that domain-specific experience can influence visual processing, even on a neural level (e.g. Tanaka & Curran, 2001), other researchers argue that professional experience does not alter visual cognition (e.g. Reingold et al., 2001). Studies comparing professionals and novices are even scarcer (cf. Beck et al., 2013; Biggs & Mitroff, 2013; Lansdale et al., 2010). Biggs and Mitroff (2013) compared the performance of professional visual searchers (aviation security screeners) to novices on a domain-general visual inspection task. Results from this study found professionals more accurate than novices, but significantly slower. To better understand the effects of professional visual search experience on basic cognitive processes, we sought to extend past research in this area by testing additional cognitive tasks and additional groups of visual search professionals. The goal of the current study is to understand how professional experience in visual search affects performance on both domain-general and domain-specific tasks. This study used a spectrum of expertise from true novices to professional imagery analysts who were experienced with synthetic aperture radar (SAR) imagery. Participants were tested on mental rotation, spatial working memory, and visual attention. In addition, participants were tested on parallel and serial visual search, visual inspection, and on a domain-specific SAR task while eye tracking data was recorded. In contrast to some of the prior literature, results from this study show that professionals are faster and more accurate on domain-general and domain-specific tasks. Our findings suggest that professional visual search expertise may affect domain-general cognition, and the effects of expertise may depend on the domain.